

REMARKS

Claims 1-16 are currently pending in the application. Claims 1, 13 and 16 are the pending independent claims.

In the outstanding Office Action, the Examiner rejected claims 1-8 and 13-16 under 35 U.S.C. §103(a) as allegedly unpatentable over U.S. Patent 6,091,110 issued to Hebert et al. (hereinafter "Hebert") in view of U.S. Patent 6,162,665 issued to Zommer (hereinafter "Zommer"), A. Sherman, "Chemical Vapor Deposition for Microelectronics," (hereinafter "Sherman") and S. Savastiouk et al., "Atmospheric Downstream Plasma," (hereinafter "Savastiouk"). Applicants respectfully submit that Hebert, Zommer, Sherman and Savastiouk, even if combinable, collectively do not teach each and every limitation of these claims.

By way of example only, independent claims 1, 13 and 16 each recite a stress compensation layer with a tensile stress sufficient to counterbalance at least a portion of an overall residual stress of a power transistor device (the overall residual stress being attributable, at least in part, to a thinning of a substrate of the device).

The Examiner argued that Hebert discloses an oxide stress compensation layer, which, relying on Sherman, possesses some level of tensile stress. See, for example, Office Action, page 2, 3<sup>rd</sup> paragraph. The Examiner further argued that Zommer discloses changing the thickness of a substrate, e.g., by thinning, which, relying on Savastiouk, results in residual stress in the substrate. See, for example, Office Action, page 3, 1<sup>st</sup> paragraph. Applicants respectfully disagree with the Examiner's arguments and fail to see how the combined teachings of, e.g., Hebert/Sherman and Zommer/Savastiouk, in any way render the instant claims obvious. Namely, regardless of whether or not the Examiner's characterization of the references is correct, the proposed combination of references, at the very least, fails to teach employing a stress compensation layer with a tensile stress sufficient to counterbalance at least a portion of an overall residual stress present in the device.

Specifically, nothing in the combined teachings of Hebert, Zommer, Sherman and Savastiouk at all suggests that a stress relief layer would be sufficient to counteract any amount of stress that may be present in a device. For example, Hebert contains no teachings whatsoever

regarding the purpose, function or any other substantive property of the oxide stress compensation layer.

The Examiner stated that “since the stress relief in Hebert is related to the presence of a film with a tensile stress (Sherman), the back thinned substrates containing residual stress through the substrate (Savastiouk) can be ‘relaxed’ using the invention of Hebert.” Office Action, page 7, 1<sup>st</sup> paragraph. Applicants however respectfully assert that to arrive at such a conclusion, the Examiner would have to impermissibly use the teachings of the present application as a guide to both piece together unrelated reference teachings and to supply non-obvious limitations not present in the combined teachings. For example, the combined teachings of the references, as highlighted above, do not at all relate the tensile stress of a layer with any residual stress in a device.

Further, Applicants note some inaccuracies in the Examiner’s characterization of Hebert. Namely, the Examiner stated that, “Hebert discloses a method for controlling the curvature . . . of a device.” See Office Action, page 2, 3<sup>rd</sup> paragraph. However, Applicants cannot find any mention of curvature and/or controlling curvature of a device in Hebert. Respectfully, there is nothing in Hebert to suggest that the disclosed stress relief layer has anything to do with device curvature.

Regarding claims 2-8 and claims 14 and 15, Applicants respectfully submit that these claims are allowable at least by virtue of their dependence from independent claims 1 and 13, respectively, for the reasons identified above. However, these claims define additional separately patentable subject matter for the reasons identified below.

For example, with regard to claim 7, this claim calls for the steps of thinning the substrate and applying a stress compensation layer to be performed repeatedly until a desired curvature is attained. The Examiner claimed that even though Hebert does not disclose techniques for obtaining desired curvatures, “it would have been obvious . . . to obtain a ‘desired’ curvature by performing a series of tests to optimize the curvature, wherein parametric thinning and deposition of an oxide would be used as variables.” See Office Action, page 4, 1<sup>st</sup> paragraph. Applicants respectfully disagree. None of the cited references contain any teachings directed to device curvature. Therefore, it cannot be asserted that techniques for attaining a desired

curvature are reasonably obvious over those combined teachings. As such, withdrawal of the rejection is respectfully requested.

Further, Applicants respectfully submit that there exists no motivation to combine the teachings of Hebert with those of Zommer, Sherman and Savastiouk. The Federal Circuit has stated that when patentability turns on the question of obviousness, the obviousness determination “must be based on objective evidence of record” and that “this precedent has been reinforced in myriad decisions, and cannot be dispensed with.” In re Sang-Su Lee, 277 F.3d 1338, 1343 (Fed. Cir. 2002). The Federal Circuit has further stated that “conclusory statements” by an examiner fail to adequately address the factual question of motivation, which is material to patentability and cannot be resolved “on subjective belief and unknown authority.” Id. at 1343-1344.

Applicants submit that the Examiner has failed to provide any objective evidence of motivation to combine the references, or to modify their teachings, e.g., to meet the particular limitations of independent claims 1, 13 and 16. Instead, the Examiner provided the following statement of obviousness regarding the proposed combination of Sherman and Hebert: “[i]t would have been obvious to one of ordinary skill in the art at the time of the invention to combine Sherman with Hebert to obtain a film having tensile stress to relieve residual stress within the device.” Office Action, page 2, 3<sup>rd</sup> paragraph (appearing again at page 4, 3<sup>rd</sup> paragraph). This conclusion is merely impermissibly stating a feature of the present claims as the motivation to combine the teachings of the references.

Further, the Examiner stated, in regard to the combination of Zommer and Hebert, that “[i]t would have been obvious to one of ordinary skill in the art at the time of the invention to use the procedures of Zommer in Hebert to obtain a backsurface thinned substrate with altered resistivity and breakdown voltage.” Office Action, page 3, 1<sup>st</sup> paragraph (appearing again at page 5, 1<sup>st</sup> paragraph). However, Applicants respectfully submit that there is no teaching, for example, in Hebert, that in any way suggests that altered resistivity and/or breakdown voltage would be favorable, or even practical.

The Examiner further rejected claims 9-12 under 35 U.S.C. §103(a) as allegedly unpatentable over Hebert in view of Zommer, Sherman and Savastiouk and further in view of

Wilson et al., "Handbook of Multilevel Metallization for Integrated Circuits," (hereinafter "Wilson"). As presented above, independent claim 1, from which claims 9-12 ultimately depend, is patentable over the combination of references cited against it. Therefore, for at least that reason, claims 9-12 are also patentable. However, these claims define additional separately patentable subject matter.

For example, claim 10 recites that the stress compensation layer maintains the curvature of the device. The proposed combination of Hebert, Zommer, Sherman, Savastiouk and Wilson fails to teach this limitation. The Examiner argued that since Wilson discloses an equation related to stresses in a deposited thin film that will cause the structure to bend, "optimization [of structure parameters] can be used to . . . maintain curvature." Office Action, page 6, 1<sup>st</sup> paragraph. Applicants respectfully disagree with the Examiner's characterization of the teachings of the references. Wilson is directed to determining the amount of bend experienced as a result of the stresses in a deposited thin film. Namely, Wilson teaches simply "measuring the change in wafer curvature before and after the film deposition." Wilson, page 223, 2<sup>nd</sup> paragraph (emphasis added). As highlighted above, the combination of Hebert, Zommer, Sherman and Savastiouk does not in any way disclose curvature. Therefore, the proposed combination of those references with Wilson has absolutely nothing to do with controlling and/or maintaining, in any way, the curvature of a device.

In view of the foregoing, the invention, as claimed in claims 1-16, cannot be said to be taught or suggested by the collective teachings of Hebert, Zommer, Sherman, Savastiouk or Wilson. Accordingly, Applicants submit that all of the pending claims are in condition for allowance and such favorable action is earnestly solicited.

If any outstanding issues remain, or if the Examiner has any further suggestions for expediting allowance of this application, the Examiner is invited to contact the undersigned at the telephone number indicated below.

The Examiner's attention to this matter is appreciated.

Respectfully submitted,



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Date: October 15, 2004